


PATENT

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Signature

Applicant : Young-Jun Kim, et al. Confirmation No. 4124
Application No. : 10/767,875
Filed : January 29, 2004
Title : METHOD OF PREPARING A NEGATIVE ELECTRODE FOR A
RECHARGEABLE LITHIUM BATTERY, METHOD OF
FABRICATING A RECHARGEABLE LITHIUM BATTERY AND A
RECHARGEABLE LITHIUM BATTERY

Grp./Div. : 1795
Examiner : Keith D. Walker

Docket No. : 51813/P849

APPELLANT'S BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Post Office Box 7068
Pasadena, CA 91109-7068
May 5, 2008

Commissioner:

1. REAL PARTY IN INTEREST

The real party in interest is Assignee, Samsung SDI Co., Ltd.

2. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

3. STATUS OF CLAIMS

Claims 10 and 12 are pending in the application. Claims 1-9 and 11 have been canceled. Claims 10 and 12 have been rejected. The rejection of each of claims 10 and 12 is appealed.

4. STATUS OF AMENDMENTS

This appeal is taken from a final Office Action of November 26, 2007 which responds to an Amendment filed on September 7, 2007.

5. SUMMARY OF CLAIMED SUBJECT MATTER

Claims 10 and 12 have been rejected and are appealed. Both of these claims are independent. Claim 10 is directed to a negative active material consisting essentially of a carbonaceous negative active material and an aqueous binder. *Specification, page 3, lines 19-29*. The aqueous binder consists essentially of a butadiene-based rubber and a cellulose-based compound. *Specification, page 3, lines 30-33*. During charging of the rechargeable lithium battery, a total amount of gas is generated, where the gas has a CO content of 30 volume % or less and a H₂ content of 0.2 volume % or less. *Specification, page 4, line 8-21*.

Independent claim 12 is directed to a lithium battery comprising a positive electrode, a negative electrode consisting essentially of a carbonaceous negative active material and an aqueous binder, and a separator. *Specification, page 3, lines 19-33; page 4, lines 24-29*. The aqueous binder consists essentially of a butadiene-based rubber and a cellulose-based compound. *Specification, page 3, lines 30-33*. A total amount of gas generated during initial charging of the lithium battery has a CO content of 30 volume % or less and a H₂ content of 0.2 volume % or less. *Specification, page 4, line 8-21*.

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether the Examiner erred in interpreting claims 10 and 12 as product-by-process claims. Whether the Examiner erred in rejecting claims 10 and 12 under 35 U.S.C. §102(b) as anticipated by Idota (U.S. Patent No. 5,618,640). Whether the Examiner erred in rejected claims 10 and 12 under 35 U.S.C. §103(a) as obvious over Idota.

7. ARGUMENT

The Examiner has interpreted claims 10 and 12 as product-by-process claims. In so construing the claims, the Examiner asserts that the limitation that a total amount of gas generated during initial charging has a CO content of 30 volume % or less and a H₂ content of 0.2 volume % or less renders the claims product-by-process claims "since the product is claimed as a result of a process." November 26, 2007 Office action, page 2. However, the amount of gas

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generated, as claimed, is a property of the lithium battery and negative electrode, and does not constitute a step in any process by which the lithium battery or negative electrode is made. As noted in M.P.E.P. §2173.05(p), a product-by-process claim is a "product claim that defines the claimed product in terms of the process by which it is made." In the present claims, the claimed product is the negative electrode or the lithium battery, and no process of making the negative electrode or lithium battery is recited. Rather, the claims recite a property of the negative electrode or lithium battery upon *use* of the battery. In particular, initial charging of the lithium battery is only conducted after the battery is fabricated, and the present claims recite a property of the battery (or negative electrode) *after* fabrication and *use* of the end product. No process steps for the fabrication of the battery or negative electrode are recited, and therefore, the battery and negative electrode are not claimed as a result of any process, as required by M.P.E.P. §2173.05(p) for characterization as a product-by-process claim. As such, the Examiner's interpretation of the claims as product-by-process claims is improper.

Turning to the prior art rejections, claims 10 and 12 have been rejected under 35 U.S.C. §102(b) as allegedly anticipated by, or in the alternative under 35 U.S.C. §103(a) as allegedly obvious over Idota (U.S. Patent No. 5,618,640). The Examiner maintains this rejection in part due to his improper characterization of the claims as product-by-process claims. As a result, the Examiner has given no patentable weight to the limitation in the claims that a total amount of gas generated during initial charging has a CO content of 30 volume % or less and a H₂ content of 0.2 volume % or less. However, the Examiner's interpretation of the claims as product-by-process claims for inclusion of this limitation is improper, as discussed in detail above. Accordingly, patentable weight should be given to the limitation that a total amount of gas generated during initial charging has a CO content of 30 volume % or less and a H₂ content of 0.2 volume % or less. Idota nowhere teaches or suggests this feature. Indeed, Idota fails to mention any generation of gas upon initial charging, and therefore fails to teach or suggest the specific gas recited in claims 10 and 12 of the present application.

The Examiner also maintains the rejections over Idota because "Idota discloses a rechargeable lithium battery with a negative electrode consisting essentially of a carbonaceous material as the negative electrode active material." Office action, page 3. In addition, the

examiner argues that applicant admitted that Idota teaches a negative electrode consisting essentially of a carbonaceous material and that the passage in Idota cited by applicant in the response filed on September 7, 2007 teaches a negative electrode consisting essentially of a carbonaceous material. Office action, page 4. However, applicant has not admitted that Idota teaches such a negative electrode, and the passage in Idota cited by applicant in the previous response does not teach such a negative electrode. Rather, in the September 7, 2007 response, applicant argued that although Idota appears to disclose a negative active material having some carbonaceous material, the Idota negative electrode does not *consist essentially of* the carbonaceous material, as recited in the present claims, and Idota expressly teaches away from the use of a negative electrode *consisting essentially of* a carbonaceous material.

The transitional phrase "consisting essentially of," used in claims 10 and 12, excludes those materials that would materially affect the basic and novel characteristics of the claimed invention. Idota discloses a negative active material in which the main component is a $M^1M^2_pM^4_q$ compound in which M^1 and M^2 may be Si, Ge, Sn, Pb, P, B, Al, As or Sb and M^4 may be O, S, Se or Te. See Column 4, lines 19-33. The addition of a $M^1M^2_pM^4_q$ compound to a carbonaceous negative active material, as claimed in the present application, would materially affect the characteristics of the claimed invention.

That the addition of a $M^1M^2_pM^4_q$ compound to a carbonaceous negative active material as present claim would materially affect the characteristics of the claimed invention is evidenced by the disclosure in Idota. At Column 1, lines 17-32, Idota notes that metallic lithium precipitates on carbonaceous negative active materials upon overcharge or rapid charge. In addition, Idota notes that carbonaceous materials have low density and low capacity per unit volume, thereby limiting the discharge capacity of the battery. In response to these limitations, Idota discloses the use of a $M^1M^2_pM^4_q$ compound as the main component of the negative active material. Given this disclosure, Idota expressly teaches away from a negative electrode consisting essentially of a carbonaceous material.

To the extent the Examiner argues that the passage in the Background section of Idota, at column 1, lines 15-35, discloses a negative electrode consisting essentially of a carbonaceous material, Applicant notes that this passage fails to disclose the negative electrode as claimed. In

particular, while this passage discusses the disadvantages of calcined carbonaceous materials, the excerpt fails to disclose the use of any aqueous binder, and thus fails to disclose the use an aqueous binder consisting essentially of a butadiene-based rubber and a cellulose-based compound, as recited in claims 10 and 12. To remedy this deficiency, the Examiner relies on column 13, lines 40-66, and column 20, lines 24-27 of Idota for disclosure of the binder. However, these excerpts disclose the use of a binder only in combination with $M^1M^2_pM^4_q$ material in which M^1 and M^2 may be Si, Ge, Sn, Pb, P, B, Al, As or Sb and M^4 may be O, S, Se or Te. As Idota expressly teaches away from the use of carbonaceous materials at column 1, lines 15-35, those of ordinary skill in the art would not be motivated to combine a carbonaceous material with the binder disclosed only in combination with the $M^1M^2_pM^4_q$ compound.

"Even when obviousness is based on a single prior art reference, there must be a showing of a suggestion or motivation to modify the teachings of that reference." *In re Kotzab*, 217 F.3d 1365, 55 U.S.P.Q. 2d 1313, 1315-16 (Fed. Cir. 2000) (holding that where a single reference recited all of the elements of the claimed invention, absent a suggestion to combine the elements as claimed, the claim at issue is not obvious). While the suggestion or motivation to combine the teachings need not be explicitly stated in the reference, the suggestion or motivation must be understood by those of ordinary skill in the art, and the examiner's analysis in making the rejection over the reference must explicitly describe the suggestion or motivation. *See KSR International Co. v. Teleflex Inc.*, 82 U.S.P.Q.2d 1385, 1396 (U.S. 2007)("KSR"). Specifically, "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." Rather, it is "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *Id.*

In the present case, the examiner has pointed to no suggestion or motivation in Idota to combine a carbonaceous material and an aqueous binder to make a negative active material generating a gas upon initial charging having a CO content of 30 volume % or less and a H₂ content of 0.2 volume % or less. Rather, the examiner merely points to unrelated excerpts in Idota, one of which expressly teaches away from the use of carbonaceous materials, the other of which discuss the use of a binder only in connection with a $M^1M^2_pM^4_q$ material. November 26,

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2008 Office action, page 3. Such conclusory statements are precisely the type of rejection the Supreme Court in *KSR* admonished as insufficient to support a conclusion of obviousness. *KSR*, 82 U.S.P.Q.2d at 1396 (stating "[r]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness")(citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). The Examiner's conclusory statements fail to describe any motivation or suggestion to combine a carbonaceous material with an aqueous binder to make a negative electrode that generates a gas upon initial charging having a CO content of 30 volume % or less and a H₂ content of 0.2 volume % or less. In addition, *Idota* expressly teaches away from the use of carbonaceous materials in negative electrodes at column 1, line 15-35. As such, the Examiner's conclusory statements failing to establish a motivation to combine the background element with the binder that is part of the *Idota* invention cannot support the obviousness rejection, as the Examiner has identified no reason "that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *Id.* at 1396.

The facts of the present application are similar to those in *In re Kotzab*, 217 F.3d 1365, 55 U.S.P.Q. 2d 1313 (Fed. Cir. 2000). In that case, the examiner was reversed for improperly rejecting the claims at issue by relying on a combination of unrelated statements from a single reference. In reversing the examiner, the Federal Circuit pointed out that:

"[T]he two statements cannot be viewed in the abstract. Rather, they must be considered in the context of the teaching of the entire reference. Further, a rejection cannot be predicated on the mere identification in [a single reference] of individual components of claimed limitations. Rather, particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed."

Id. at 55 U.S.P.Q. 2d 1317. As in *In re Kotzab*, absent some motivation to combine the elements as claimed, the Examiner erred in rejecting the present claims over a unrelated passages that fail to teach the recited combination of elements.

Moreover, courts have held that the pertinent question in determining obviousness is "whether the subject matter as a whole would have been obvious to one of ordinary skill in the art following the *teachings* of the prior art at the time the invention was made." *In re Wesslau*,

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147 USPQ 391, 393 (C.C.P.A. 1965)(emphasis in original). Here, Idota teach only the use of a $M^1M^2_pM^4_q$ material in combination with a binder, and fails to teach, and in fact expressly teaches away from the use of a carbonaceous material. In addition, Idota nowhere discloses a negative active material or lithium battery that generates an amount of gas upon initial charging, and thus also fails to disclose that the amount of gas has a CO content of 30 volume % or less and a H_2 content of 0.2 volume % or less. Accordingly, applicant submits that both of pending claims 10 and 12 are allowable over Idota, and requests reconsideration of the November 26, 2007 Office action.

8. CLAIM APPENDIX

1. (Canceled).

2. (Canceled).

3. (Canceled).

4. (Canceled).

5. (Canceled).

6. (Canceled).

7. (Canceled).

8. (Canceled).

9. (Canceled).

10. A negative electrode for a rechargeable lithium battery, the negative electrode consisting essentially of a carbonaceous negative active material and an aqueous binder, the aqueous binder consisting essentially of a butadiene-based rubber and a cellulose-based compound, wherein during charging of the rechargeable lithium battery a total amount of gas is generated, the gas having a CO content of 30 volume % or less and a H₂ content of 0.2 volume % or less.

11. (Canceled).

12. A rechargeable lithium battery comprising:
a positive electrode;

a negative electrode consisting essentially of a carbonaceous negative active material and an aqueous binder, the aqueous binder consisting essentially of a butadiene-based rubber and a cellulose-based compound; and

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a separator;

wherein a total amount of gas is generated during initial charging, wherein the gas generated has a CO content of 30 volume % or less, and further wherein the gas generated has a H₂ content of 0.2 volume % or less.

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9. EVIDENCE APPENDIX

None.

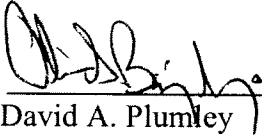
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10. RELATED PROCEEDING APPENDIX

None.

Respectfully submitted,

CHRISTIE, PARKER & HALE, LLP

By  Reg. 55,905 for
David A. Plumley
Reg. No. 37,208
626/795-9900

LES/les

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